

# The Ground Water Protection Council Produced Water Report: Lessons Learned and **What's Next for IOGCC**



John Baza, Director  
Utah Division of Oil, Gas and Mining  
August 26, 2019



# GROUNDWATER

PROTECTION COUNCIL



# PRODUCED WATER REPORT

**Regulations, Current Practices & Research Needs**

# GWPC's Interest in Produced Water

- GWPC anticipates that as states and regions look to be more water resilient, the role of produced water will expand
- To encourage expansion, this report compiles information and identifies **areas of needed legal or regulatory action and where research needs exist**
- By identifying opportunities and challenges of reusing produced water and offering options for addressing them, the GWPC hopes to facilitate the development of produced water as a supplement to freshwater resources and fulfill a part of our mission ***“to promote the protection and conservation of groundwater resources for all beneficial uses.”***

# Study Partners



# Produced Water Working Group

- State leadership | Multi-stakeholder
- Goals:
  - To identify opportunities and challenges associated with utilizing produced water as a resource
  - To provide suggestions that policy makers, researchers, regulators and others can use to address these opportunities and challenges
- Timeline:
  - Project began July 2017
  - Completed June 2019



# Report Goals

- **GWPC hopes this report will be used to:**
  - Educate the public
  - Encourage oil and gas industry, state and federal regulatory agencies to gather data
  - Inform new research
  - Expand the use of produced water in a manner that is protective of the environment and public health.



# Leadership Team

## **Project Co-leaders**

- Shellie Chard, ODEQ | John Baza, UDOGM

## **Intro. & Module 1 Leaders**

- Shellie Chard | John Baza

## **Module 2 Leaders**

- Scott Kell, ODOGRM | Tom Kropatsch, WOGCC

## **Module 3 Leaders**

- Ken Harris, DOGGR | Nichole Saunders, EDF

## **Contractors**

- Michael Dunkel, Worley
- John Veil, Veil Environmental Consulting

## **GWPC Staff**

- Mike Paque | Mike Nickolaus | Erica Carr, GWPC



# Developing Solutions: A Modular Approach

A blue banner with a white border and a white ribbon-like top edge, containing the text 'MODULE 01' in white.

## MODULE 01

### Regulatory & Legal Frameworks

This module describes the current legal and regulatory frameworks that address produced water. It also addresses changes that may need to occur to facilitate the use of produced water.

**Leadership:**

John Baza, Utah Division of Oil, Gas & Mining  
Shellie Chard: Oklahoma DEQ, Water Quality

An orange banner with a white border and a white ribbon-like top edge, containing the text 'MODULE 02' in white.

## MODULE 02

### Produced Water Use in the Oilfield

This module describes the current uses and potential future uses of produced water inside the oilfield. It defines the existing constraints of use and identifies the opportunities and challenges of expanded use.

**Leadership:**

Tom Kropatsch: Wyoming Oil & Gas Commission  
Scott Kell: Ohio Department of Natural Resources

A dark blue banner with a white border and a white ribbon-like top edge, containing the text 'MODULE 03' in white.

## MODULE 03

### Produced Water Use & Research Needs Outside the Oilfield

This module describes current and potential use of produced water outside the oilfield and identifies the research needs that will need to be addressed to facilitate expanded use.

**Leadership:**

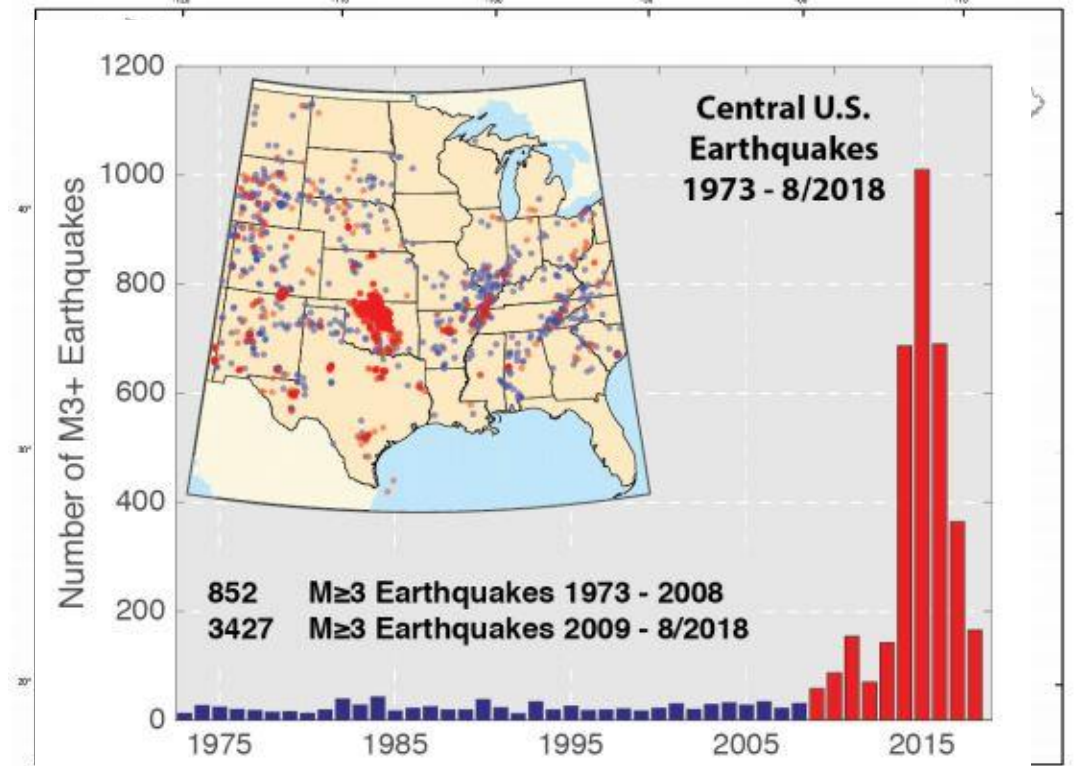
Ken Harris: California Department of Conservation  
Nichole Saunders, Environmental Defense Fund



# Produced Water:

## *What is Driving the Conversation*

- The nearly 1 million producing oil and gas wells in US generate approximately 21.2 billion barrels of produced water per year.
- Fresh water stress is driven by rising populations and regional droughts
- Volume of produced water is small compared to total daily water use, but available volumes can be significant locally

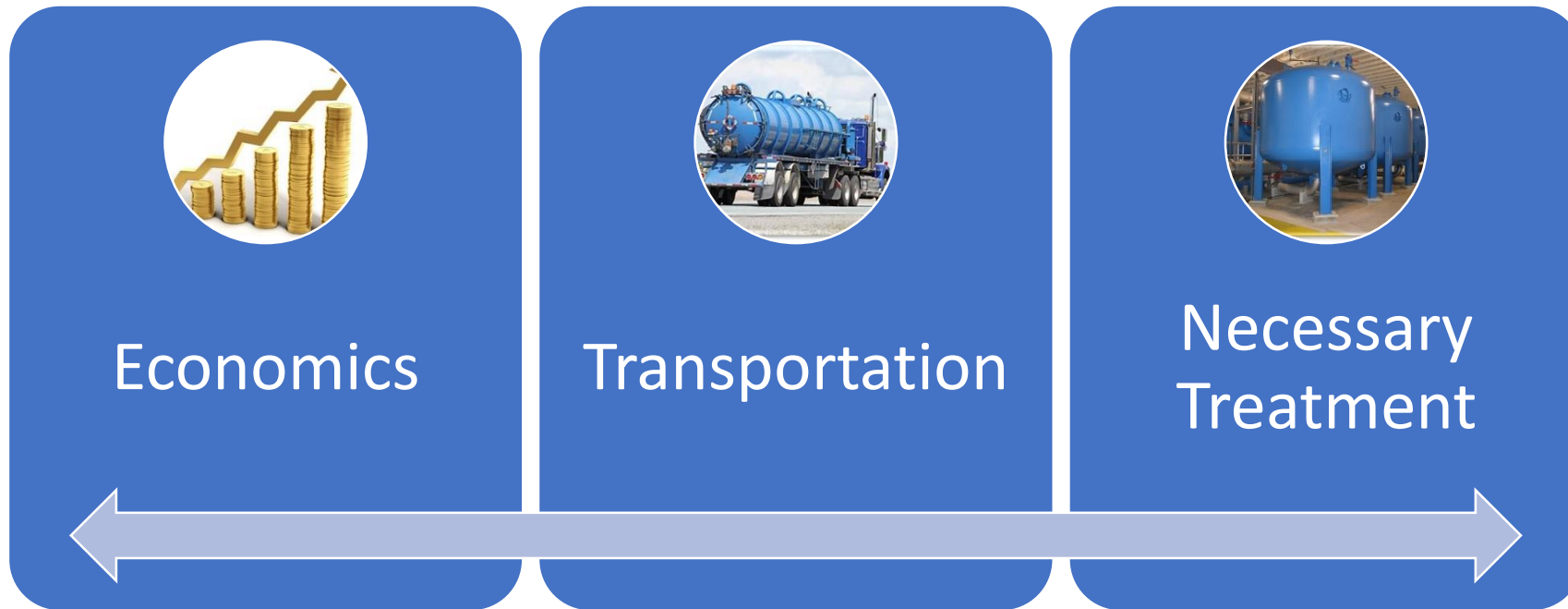


Source: <https://myweb.rollins.edu/jsiry/Waterbasics.html>

Key Point

**There are opportunities for expanded reuse of produced water both in and out of oil and gas operations yet....**

# Challenges to reuse both inside and outside of oil and gas operations remain



# Module 1: Regulatory & Legal Frameworks

**Leadership:**

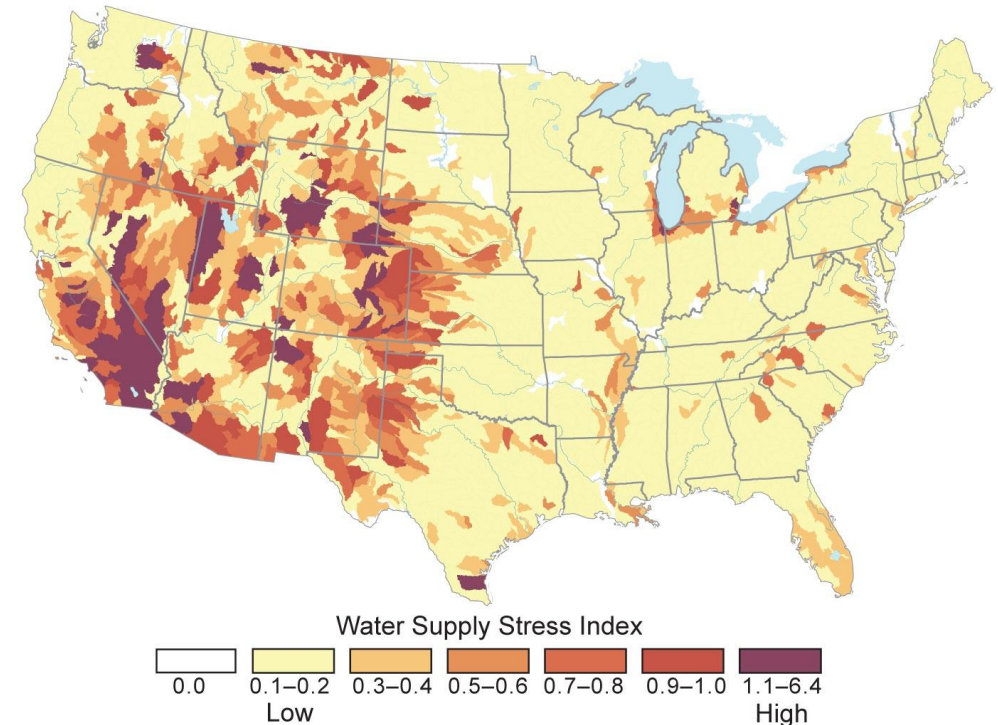
*John Baza, P.E., Director, Utah Division of Oil, Gas & Mining*

*Shellie Chard, Director, Oklahoma DEQ, Water Quality Division*

# State Water Planning

- Water planning is important to states as more regions are experiencing water shortages
- Only three of the six states reviewed in legal research include produced water as a component of their state water plans
- As treatment technology advances, populations grow and water scarcities become more pronounced, produced water could be looked at as a resource that could add to a state's water balance sheet.

Water Stress in the U.S.

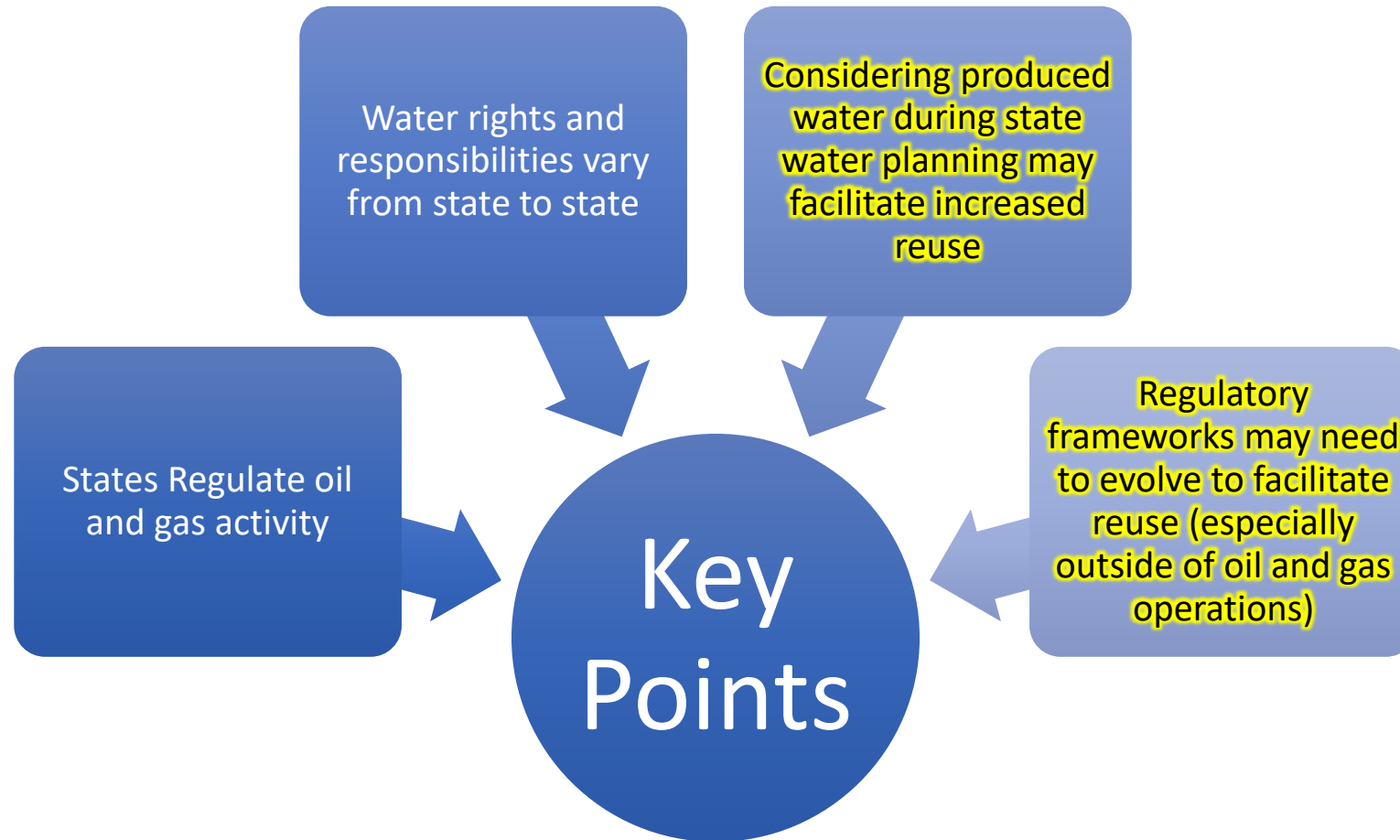


# State Example: Oklahoma

- **Oklahoma –**
  - Developed a comprehensive water plan for state based on 13 geographic regions
  - Legislative action created goal for state to use no more fresh water in 2060 than in 2010 (Water 2060 Act)
  - All water sources considered including brackish groundwater, produced water, and reuse of reclaimed water from municipal or industrial processes
  - Included conservation methods



# Module 1 Review



# Module 2:

## Produced Water Use In Oil & Gas Operations

**Leadership:**

*Tom Kropatsch, Oil & Gas Deputy Supervisor, Wyoming Oil & Gas Conservation Commission*

*Scott Kell, Assistant Chief, Division of Oil & Gas Resources, Ohio Department of Natural Resources*



# Current Water Management Practices

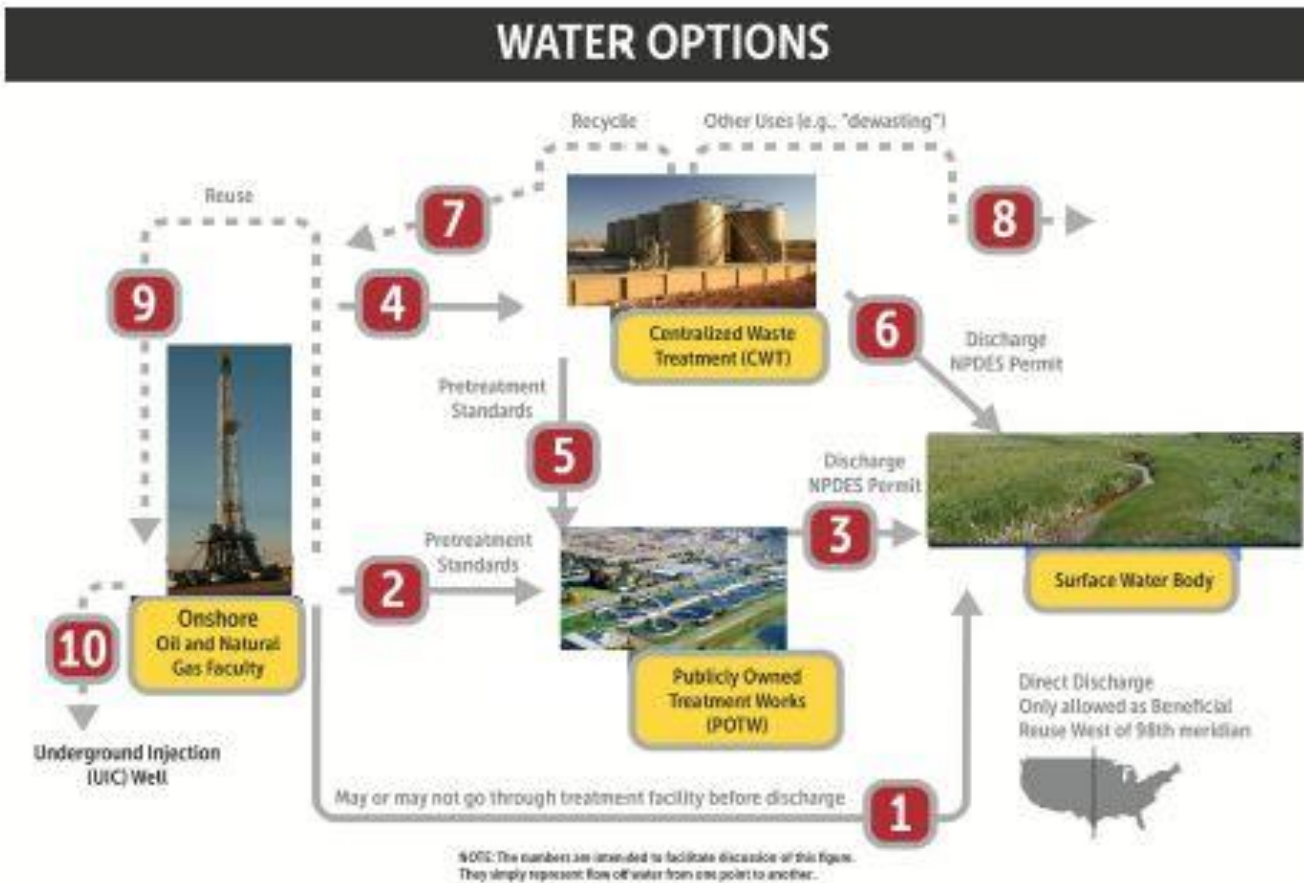
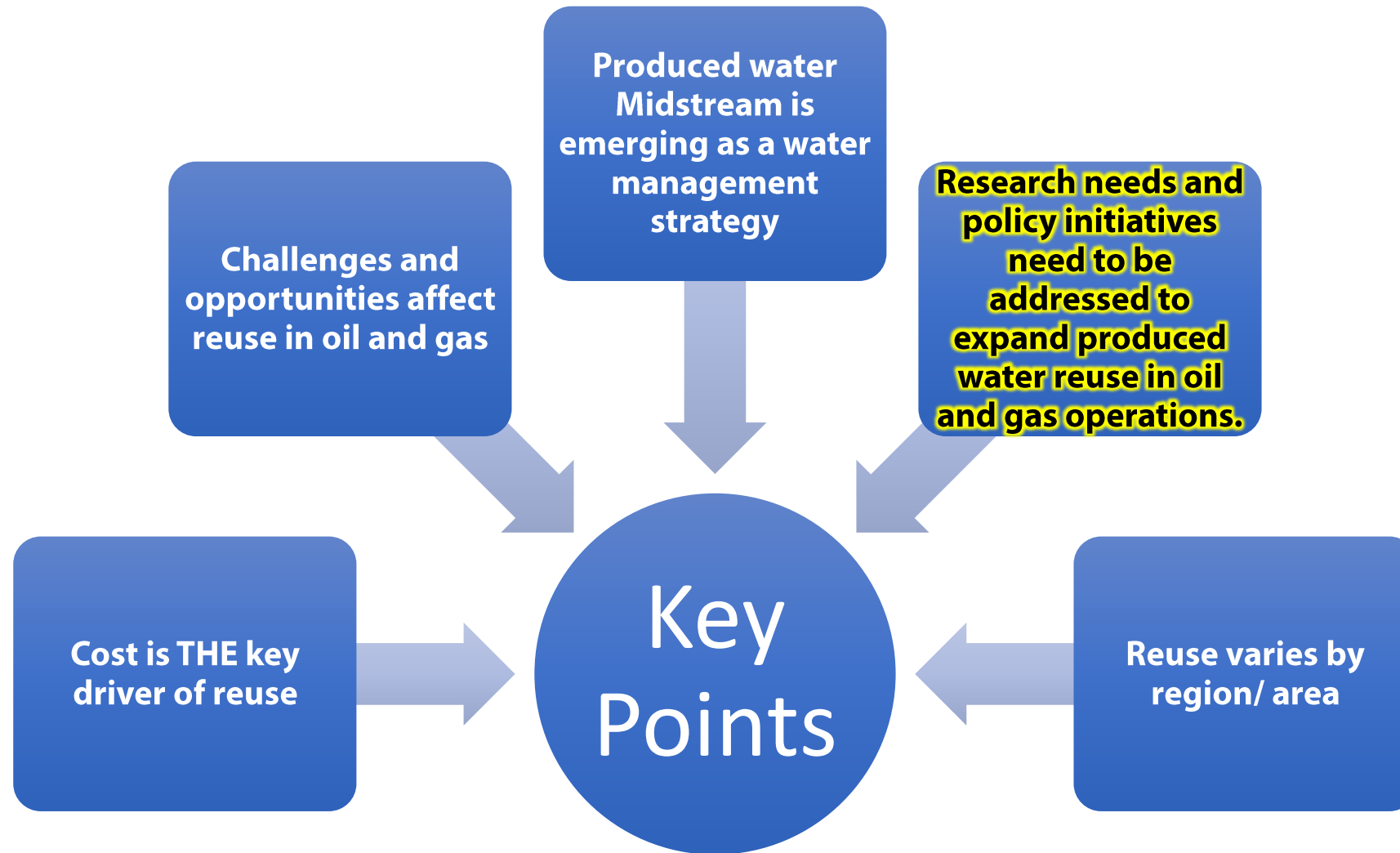


Figure INTRO-6. Options for produced water management

Source: After American Petroleum Institute (Modified)

This figure illustrates the range of alternate options for managing produced water. Options 1 through 6 show some form of discharge to surface waters, either directly or after treatment in a wastewater treatment facility or a centralized industrial wastewater treatment plant. Produced water can be used again in the oil and gas process without treatment (option 9) or after treatment (option 7). Produced water can also be put to some other use (option 8) after treatment. Option 10 shows produced water directed to injection wells. A more substantive discussion of these practices is included in Modules 1 and 2.

# Module 2 Review



# Module 3:

## Produced Water Use & Research Needs Outside of Oil & Gas Operations

**Leadership:**

*Ken Harris, State Oil & Gas Supervisor, California Division of Oil, Gas & Geothermal Resources,  
Nichole Saunders, Senior Attorney - Energy, Environmental Defense Fund*

# Module 3: The Road Ahead

- The most complicated and forward looking challenge
- Some small scale efforts exist
- Moving with caution
- **Research needs on all fronts – environmental impact**



# Module 3 Overview

- Promote an informed dialogue on current and future reuse
- Reuse outside of oil and gas operations may take various forms and drivers will differ
- Produced water treatment and research should be “fit-for-purpose”
- Potential risks to health and environment must be understood and managed to prevent unintended consequences
- Other feasibility challenges must be weighed and considered
- Risk-based decision-making concepts can be applied
- **Data and information currently available may not be adequate – research is increasing but more is likely needed**

# Expanded Opportunities for Reuse

## Outside Oil & Gas Industry

- Possibilities for further reuse with additional research
  - Land Application (e.g., irrigation)
  - Discharges to Water (e.g., to surface waters, aquifers)
  - Industrial Use (e.g., cooling water)



# Key Point

More  
research  
is needed

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graph TD; A((More research is needed)) --> B[Identifying reuse options and current or emerging needs or drivers in specific regions such as options based on produced water availability and need of nearby water users]; A --> C[Evaluating legal and regulatory questions including permitting, public perception, ownership and liability, infrastructure, treatment and solids management]; A --> D[Expanding knowledge and tools for characterization, treatment, risk assessment and reuse feasibility: <br/>• Analytical methods for characterization <br/>• Testing, piloting or implementing treatment technologies <br/>• Evaluating treatment options for Fit-for-purpose needs <br/>• Developing and implementing human health and ecological risk assessment methods];
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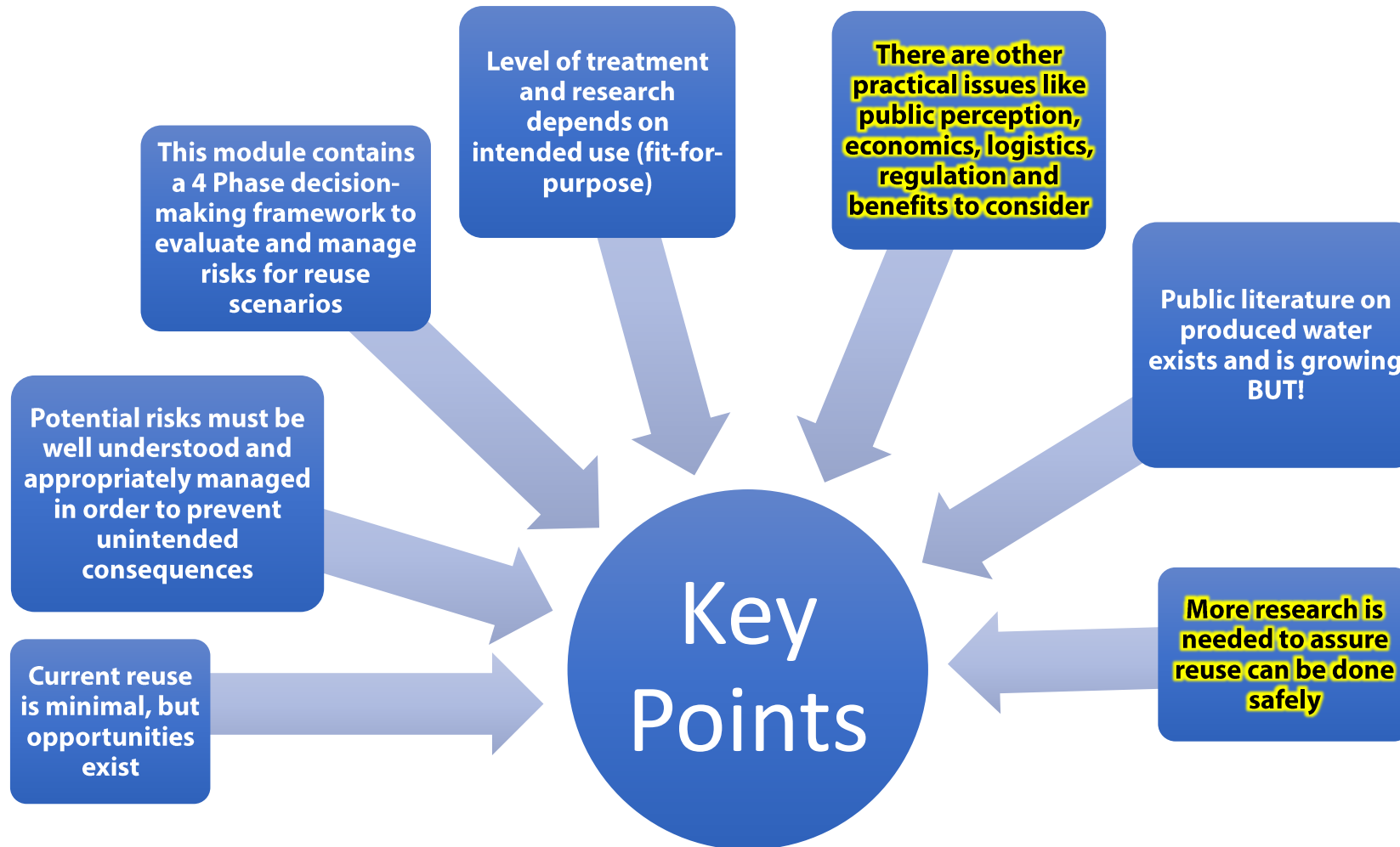
Identifying reuse options and current or emerging needs or drivers in specific regions such as options based on produced water availability and need of nearby water users

Evaluating legal and regulatory questions including permitting, public perception, ownership and liability, infrastructure, treatment and solids management

Expanding knowledge and tools for characterization, treatment, risk assessment and reuse feasibility:

- Analytical methods for characterization
- Testing, piloting or implementing treatment technologies
- Evaluating treatment options for Fit-for-purpose needs
- Developing and implementing human health and ecological risk assessment methods

# Module 3 Key Points





# Report Conclusions

# Report Conclusions

- Reuse is possible and may be cost effective in the right situations
- Oil & gas companies and end users must work together to facilitate reuse
- **Regulators can look for ways to allow reuse projects but must ensure these practices are done with proper environmental and public health protection**
- **Expanding reuse opportunities may require regulatory or legislative solutions to issues such as:**
  - **Ownership of produced water**
  - **Transfer of ownership**
  - **Determination of liability**
  - **Human health and safety concerns**
  - **Environmental risk and mitigation concerns**

Principal Report Conclusion

**Produced water  
reuse has local  
potential but  
requires careful  
thought.**



# Questions

**About the GWPC** | [www.GWPC.org](http://www.GWPC.org)

**Online Report** | [www.GWPC.org/resources/publications](http://www.GWPC.org/resources/publications)